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OF ASYNCHRONOUS INTERFERENCE (54) AVOIDANCE METHOD OF ASYNCHRONOUS INTERFERENCE AND AVOIDANCE SYSTEM

of asynchronous interference by a communication station and slave stations or the libe. system, using a TDMA-TDD which consists of a master PROBLEM TO BE SOLVED: To surely enable avoidance

readt the avoidance of the asynchronous interference sending-out of the interference detecting pecket. As a 1018 by an interference which is generated by the master station 101A or the temperary master station packet or a channel hep is executed by the temporary interference recognizes the interference detecting master station 1018 causing the asynchronous and a temporary master station 101A or a temporary sent out by a transmitting slot corresponding to the slot intensity is searched, an interference detecting packet is detected, the highest slot of a receiving electric field SOLUTION: When an asynchronous interference is

is enabled by the reliable avoidance method of the

asynchronous interfarence.

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parents station hops to a channel with said 1st new assumed-parents station at said 8th ount of un-datecting of and unique WORD at the period which could not detact said unique ssumed parenta station are counted exceeding the threshold set up beforehand (above), the rut from said 3rd assumed parents station, if said 1st assumed parents station and said 2nd ist assumed parents station and said 2nd assumed parents station and said 6th process is sent rom return and said 1st assumed-parents station at actuation of said child office. raving the 7th process which receives seid direction packet for collision control of going down corresponding to the channel of sold 1st assumed parents station, and is characterized by process. The esynchronous interference evasion approach which hops to the channel interference detection, and was computed with the random number, When sold 3rd assumedchannel which said 2nd essumed parents station has recognized reception of said packet of essumed-parents station, or said 1st assumed-parents station, Or the 8th process which avoids packet of interference detection from said 3rd assumed parents station Seid 1st assumed-(Claim 2) When said packet of interference detection stiffled from the bining in the slot of said interference of said direction packet for collision control of going down from hopping to the parents station, When sent out in secordance with the timing is the receiving slot of said 2nd slot in the packet for interference detection, and the 5th process sent out continuously, Said exceeding the threshold beforehand eat as the transmitting slot corresponding to said detected assumed-parents station, and said 3rd assumed parents station. The 4th process which judges whether the slot from which the threshold beforehand set up out of the slot in all the when said slot which corresponds at said 4th process is detected. The count (more than) station judges it as the slot in which it has interfered between said 1st assumed parents station, obtained was looked for, and the corresponding slot was detected, Said 3rd assumed parents frequencies currently used is exceeded (above), and the strongest received field strength is this — the 3rd process it enables it to transmit and receive to the slot timing of the 3rd station and synchronization, temporary — as the 3rd assumed percents station — operating erisen between said 1st assumed parents station, and it stops taking said 1st assumed parents טאיטאלט set up beforehand respectively (more than), שילע that asynchronous interference has coffishen control of going down and the count of un-detecting of said unique WORD exceed the unique WORD, and said child office When the count of reception of said direction packet for detected in said 1st process, the 2nd process which counts the count of un-detecting of said is other assumed-parents stations differ, said child office When said unique WORD cannot be collision control of going down is sent out respectively and it interferes in it seutually to the direction packet for collision control of going down was detected. When said direction packet for lissing from which said list assumed parents station and the 2nd assumed parents station which synchronization which receives the direction packet for collision control of going down from the station temporarily. The 1st process which judges whether the pringue WORD for a esynchronous interference evasion approach in a network, and can serve as an assumed-parents let assumed parents station which is said assumed parents station, and is contained in this [Claim 1] The child office of the essumed-parents station mediation mold naturork which is the

respectively that it was the stot in which it has interfered, and was respectively computed with claim 1 characterized by including the process which hops to the channel which judged the random number. WORD but was set up beforehand The asynchronous interference evasion approach according to

[Claim 3] When said slot which corrasponds at said 4th process cannot be distanted, said 5th

including the 8th process which returns to said 4th process which investigates the received field secording to claim 1 or 2 characterized by shifting the timing of sald slot a semicircle term and process said 3rd assumed-parents station If it judges that it was finished whether investigating all the slote and has finished investigating The asynchronous interference evasion approach

finish being investigated claim 1 to 3 characterized by including the process which ands processing when all the slots [Chaim 4] Said 8th process is the asynchronous interference evasion approach according to

which received the packet of said channel change demand and was respectively computed with the random number. eccording to claim 1 to 4 characterized by including the 10th process which hops to the channel said 2nd assumed parents station are the asyachronous interference evasion approach parents station and said 2nd assumed parents station. Said 1st assumed parents station and parents station, and sends out the packet of a channel change demand to said 1st assumedthan). The 9th process which judges that interference has erisen between said 1st assumedcount of error detection of a packet exceed the threshold set up beforehand respectively (more station and the signal from said 2nd assumed-parents station interfered, an error is detected. When the count of reception of said direction packet for collision control of going down and the WORD, and since it becomes the packet with which the signal from eald 1st assumed parents control of going down respectively using the same charmel, Said child office detects said unique assumed-parents station have synchronized and sent out said direction packet for collision [Claim 5] When, as for said 1st process, said 1st essumed parents station and said 2nd

usual ad hoc protocol. since there is no detection of the error of a packet, and operates according to actuation of the unique WORD, judges that said 1st assumed parents station and synchronization can be taken approach according to claim 1 to 5 characterized by including the process which detects sald respectively by the separate charmel, Seld ohid office is the asynchronous interference evasion assumed parants station have sent out said direction packet for collision control of going down [Claim 8] When, as for said 1st process, said 1st easumed parents station and said 2nd

(following) set up beforehand beforehand, or when the count of un-detecting of said unique WORD is below the threshold direction packet for collision control of going down is below the threshold (following) set up claim 1 to 8 characterized by returning to said 1st process when the court of reception of said [Claim 1] Said 3rd process is the asynchronous interference evasion approach according to

beforehand, or when said count of error detection of said packet is below the threshold direction packet for collision control of going down is below the threshold (following) set up (following) set up beforehand, claim 1 to 7 characterized by returning to said 1st process when the count of reception of said (Claim 8] Said 9th process is the asynchronous interference evasion approach according to

including the 10th process sent out continuously. processing in said the 4th process and said 5th process when this 10th process is performed interference evasion approach according to claim 1 to 8 characterized by not performing interference detection by all the siots that can be used (more than). The asynchronous station temporarily. The count exceeding the threshold beforehand set up in said packet of [Chaim 9] When, as for eaid 3rd process, said child office operates as 3rd assumed parents

is not detected When said unique WORD is repeatedly detected in the range which can detect corresponding slot is detected. The actuation which investigates whether the location of said slot is shifted before [a bit of] "1", and said unique WORD is detected when said unique MORD [Claim 10] Said 4th process investigates whether said unique WORD is detected, when said

electric field, By sending out the packet of a channel change demand by the transmitting shet corresponding to said shet, said list assumed parents slation. Or the asynchronous interference was ion approach according to claim (to 9 characterized by not performing processing in said 5th process when this 11th process is performed including the 11th process to which channel hop is carried out to said 2nd assumed parents station.

[Claim 11] The storage with which the program which can perform the asynchronous interference evasion approach according to claim 1 to 10 was recorded.

Fability And a de . . .

arents station. The asynchronous interference evasion system characterized by receiving sold unique WORD of said packet of interference detection un-detecting. Or when said packet of fraction packet for collision control of going down from said 1st assumed-parents station as hannel hop, after hopping to the channel corresponding to the channel of said 1st assumedcomputed. Said 3rd assumed-parents station When said 1st assumed-parents station carries out thernel which generates a random number and hops to a degree in order to avoid interference is nterforance detection is judged as an error packet by which the error was detected. The interference detection is judged in said 2nd assumed—parents station, Or when it judges said to a degree is computed. Said 1st assumed-parents station, Or when reception of eald packet of resumed-perorts station. The charmel which generates a random number respectively and hops channel change demand which received in soid 1st assumed parents station and asid 2nd obtained. And seid hop place channel calculation section it is based on said packet of the transmitting stot corresponding to the slot from which the strongest received field strength is interference detection is continuously sent out the number of times set up beforehend from the 3rd essumed-parenta station temporarily, and are used is exceeded (with above). The packet for beforehand set up out of the slot in all the frequencies that are operating by the function of the station in said ad hoc protocol processing section, and said child office. The threshold assumed parents station. It is based on decision of interference with said 1st assumed parents of a channel change demand is sent out to said 1st assumed parents station and said 2nd processing section, and said 2nd assumed-parents station, the RF section which performs transmission and reception, modulation, and recovery of an electric wave is minded. The packet decision that there is interference by said 1st assumed-parents station in said ad hap protocol 1st assumed perents stayon and said child office. Said TDMA-TDD processing section Based on ect up beforehend respectively (more than). It is judged that interference has erisen in said the going down in said number storage section of receive packets and the count of unique WORD un-detecting in said count storage section of unique MORD un-detecting exceed the threshold said unique WORD. When the count of reception of said direction packet for callision control of assumed-parents station, Said TDMA-TDD processing section of said child office carnot detect said assumed parents stations which transmit information to said child office, and other 2nd (more than), It is judged that interference has erisen in the assumed perents station of [1st] count storage section of error detection exceed the threshold set up beforehand respectively storage section of receive packets and the count of arror detection of the receive packet in sold the count of reception of said direction packet for collision control of going down in said number protocal processing section Said unique WORD for said TOMA-TDO processing section to take one child offices which can operate said assumed parents office temporarily. Said ad hoc the synchronization with said essumed parents station and said child office is detected. When seebon which computes the channel which generates a random number and hops. It has two or detection produced in the packet which received, it has the hop place charmel calculation memorizes the packet which received. The count storage section of unique WORD un-detecting which exemorizes the count from which the unique WORD which the direction packet for collision detecting. The count storage aection of error detection which memorizes the count of error control of going down sent out from the assumed-parents station of said natwork has was arin an ad hoc network. The number storage section of receive packets which counts and processing section. The ad hoc protocol processing section which processes the protocol used cenerates a periodic pulse signal and is supplied to seid RF section and said TDMA-TDD system in a notwork, and performs processing about TDMA-TDD, The clock section which [Chaim 12] The TDMA-TDO processing section which is an asynchronous interference evasion

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packets for every non-detected notice. characterized by storing "1" In addition to the value of said number storage section of receive Department, Or the asynchronous interference evasion system eccording to claim 12 detaction section. Detection of sald unique WORD from said unique WORD Banking Inspection section of unique WORD un-detecting. "I" is edded and stored in the value of said count Barking Inspection Department "I" is added and stored in the value of said count storage storage section of error detection for every error indication of a receive pecket from said error processing section For every non-detected notice of seid unique WORD from said unique WORD strength investigation means to investigate said received field strength. Said ad hoc protocol which received in said frame processing section when an error was not detected, it has a field Banking Inspection Department which detected delivery and said unique WORD for the packet section. The error detection section which receives a receive packet from the unique WORD receive packet, and the result of error detection is notified to said ad hoc protocol processing detected to seid ed hoc protocol processing section (sweetigate whether there is any error in a whether said unique WORD was detected from the receive packet, and said unique WORD was section, With the unique WORD Banking Inspection Department which notifies the result of section, and was received from said frame processing section specified, and is passed to said RF the receive packet of the slot specified out of the receiving bit string received from said RF processing section which embeds into the slot which had the transmitting packet which took out packets received from said RF section to said ad hoc protocol processing section. The slot processing section has the relation to said ad hoc protocol processing section among the [Claim 13] The frame processing section which passes only the packet in which said TDMA-TDD return and said child office in actuation by the function of said child office.

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DET ALLED DESCRIPTION

Detailed Description of the Invention

interference of the electric wave between a key station and a child office. interforence evasion approach and asynchronous interference evasion system which avoid Padd of the Invention] This Invention belongs to the technique about the asynchronous

4. and 5. and migration machines 8, 7, 8, and 8, conventional method consists of a wireless communication control unit 1, wireless contacts 2, 3, asynchronous interference of the conventional technique. As shown in <u>changs 11</u>, this [0003] <u>Drawing 11</u> to the block diagram showing an example of a method which avoids 67169 A is proposed as a conventional asynchronous interference evation method. (Description of the Prior Art) The method which evoids asynchronous interference to JP,J-

moving in the inside of a system. through the wireless contacts 2, 3, 4, and 5 and the wireless consumication control unit $1, \dots$ the wireless communication control unit 1. The migration machines 6, 7, 8, end 9 communicates and release of a wireless circuit with the migration machines 6, 7, 8, and 8 under management of system. The wireless contacts 2, 3, 4, and 5 supervise a radio channel while carrying out setup public network or other mobile communication system, and the wireless circuit in a system, migration management of the migration machines 8, 7, 8, and 9, and wireless management of a [0004] The wireless communication control unit 1 performs exchange control with a common

(0005) The wireless zones 10A, 10B, 10C, and 10D are respectively set up to the wireless

[0006] $\overline{Dremins.12}$ is the block disgram showing the configuration of the wireless contacts 2, 3, 4,

interference detecting element 107, the interfece section 108, and a slot synchronizer 109. control section 105, the communication channel control section 106, an asynchronous 102, the modern section 103, frame generation / decomposition section 104, the control channel [0007] The wireless contacts 2, 3, 4, and 5 consist of antenna section 101% the wireless section

a frequency 12, slot 45). When an empty carrier becomes unusable, a new empty charnel is vacant, and is notified to the migration machine § as a notice of cerrier information (in this case, channels. The information about this empty carrier is put on slot 2S under communication link, is prepared for the wireless contact 2, and the empty carrier is searched using this slot for reserve and actuation of the wireless communication control unit 1 is explained. The migration exactine 6 frequency f1. The slot for raserve channels (in this case, slot 4S) which is not usually used is and the wireless contact 2 carry out to it being under communication link using stot 2S of a control unit 1 of <u>drawing 11</u>. Here, the migration mechine 8 and the wireless contact 2 are lifted [0008] <u>Drawing 13</u> is drawing showing the flow of the actuation in the mireless communication

points in stat 2S under communication link by the asynchronous interference detecting element [0009] in the meantime, the wireless contact 2 measures the receiving level of two or mans 107, and reports the result to the coormunication channel control section 108. When the

JP.2001-958642,A [DETAILED DESCRIPTION]

222ページ

division system, and starting interference evasion actuation efficiently $oldsymbol{j}$ is exhibited. the burst frame in the signal wave of choice of a digital mobile radio communication link of timeeffectively exactly interference which an asymphronous interference wave does from the back of esynchrozous interference evasion approach which becomes possible [detecting especially [0010] Marcover, in No. 2553286 of a patent official report, the technique about the IS and slot 3S are shown, and other explanation is omitted origration machine 6 side, and also making it operate similarly is performed. All over drawing, slot to the communication channel (a frequency 22, slot 45) notified as empty carrier information. The beforehand, to addition, forming the asynchronous interference detecting element 107 in the receive, and changes it to the communication channel (a frequency f2, slot 4S) notified migration machine 6 detects that the signal transmission which has received until now cannot connection with this measurement result and asynchronous interference is detected, it changes construirication channel control section 106 performs asynchronous interference detection in

terminal side is operating with the do-battery carried out channel hop was also considered, and decision that interference occurred had the trouble of not being certain, by not receiving the which interference generated and stopping receiving the signal from a terminal side if the channel hap. However, having consumed the power of a dc-battery other than the fector as for side, the mireless contects 2, 3, 4, and 5 will detect esymphronous interference, and will carry out detecting element and which was notified beforehand, by not receiving the signal from a terminal channel as for which the terminal side detected interference by the asynchronous interference which are the migration machines 6, 7, 8, and 9. Then, although hopped to the communication method, an asynchronous interference detecting element will be prepared in the terminal side wireless contacts 2, 3, and 4 and 5 using the conventional asynchronous interference evasion the conventional technique. When coping with the asynchronous interference between the Problem(s) to be Solved by the Invention) However, there was a trouble hung up over below in

network where an assumed parents station exists. detection transmitted from the child office in the assumed parents station mediation and assumed parents station makes a reception judgment of the packet for the interference asynchronous interference evasion system which avoid interference certainly because an the point of offering the technique about the asynchronous interference evasion approach and [0012] This invention is made in visar of this trouble, and the place made into the purpose is in

threshold beforehand set up out of the slot in all the frequencies currently used is exceeded ard assumed parents station The 4th process which judges whether the slot from which the enables it to transmit and receive to the slot timing of the 3rd assumed-perents station, and said temporary — as the 3rd assumed parents station — operating — this — the 3rd process it parants station, and it stops taking said 1st assumed-parents station and synchronization. count of un-detecting of said unique WORD exceed the threshold set up beforehand respectively above), and the strongest received field strength is obtained was looked for, and the (more than), Judge that asynchronous interference has arisen between said 1st assumed-When the count of reception of said direction packet for collision control of going down and the process which counts the count of un-detecting of said unique WORD, and said child office differ, said child office When said unique WORD cannot be detected in said 1st process, the 2nd parents station and the 2nd assumed perents station which is other assumed parents stations out respectively and it interferes in it mutually to the timing from which said 1st assumedgoing down was detected, When said direction packet for collision control of going down is sent unique WORD for a synchronization contained in this direction packet for collision control of station temporarily is said assumed parents station. The 1st process which judges whether the assumed-parenta station mediation moid network which can serve as an assumed-parents control of going down is received from the 1st assumed parents station whose child office of the asynchronous interference evasion approach in a network. The direction packet for collision [Means for Solving the Problem] The summery of this invention according to claim 1 is the

JP,2001-358642,A [DETAILED DESCRIPTION]

noc protocol. For said 3rd process, the summary of this invention according to claim 7 is the characterized by including the process which operates according to actuation of the usual ad consists in the asynchronous interference evasion approach according to claim 1 to 5 child office detects said unique WORD and does not have detection of the error of a packet. It is judged that said 1st assumed-parents station and synahronization have been taken since seid said direction packet for collision control of gaing down respectively by the separate channel, it with the rendom number. The summary of this invention according to claim 6 said 1st process When eald let essumed purents station and said 2nd assumed parants station have sent out characterized by including the 10th process which haps to the charmel respectively computed consist in the asynchronous interference evasion approach according to claim 1 to 4 said 2nd assumed parents station receive the packet of said channel change demand, and parents station and seid 2nd assumed parents station. Said 1st assumed parents station and parents station, and sends out the packet of a channel change demand to said 1st assumedthan). The 9th process which judges that interference has arisen between said 1st assumedcount of error detaction of a packet exceed the threshold set up beforehand respectively (more When the count of reception of said direction packet for collision control of going down and the station end the signal from said 2nd assumed-parents station interfered, an error is detected. control of going down respectively using the same channel. Said child office detects said unique 2nd assumed parents station have synchronized and sent out said direction packet for collision WORD, and since it becomes the packet with which the signed from said let assumed perents process which ends processing when all the slots finish being investigated. The summary of this invention according to claim 5 said 1st process When said 1st assumed parents station and said evasion approach according to claim 1 to 3 characterized by said 8th process including the summary of this invention according to claim ♦ consists in the asynchronous interference ovasion approach according to claim 1 or 2 characterized by including the 8th process which returns to said 4th process which investigates the received field strength of all slots. The timing of said slot is shifted a semicircle term and it consists in the asynchronous interference corresponds at said 4th process cannot be detected, said 3rd essumed parents station If it summary of this invention according to claim 3 said 5th process When said slot which process which hope to the channel respectively computed with the random number. The esynchronous interference evasion approach eccording to claim I characterized by including the judges that it was finished whether investigating off the clots and has finished investigating The beforehand it judges respectively that it is the slot in which it has interfered, and consists in the unique WORD at the period which could not detect said unique WORD but was set up counted exceeding the throshold set up beforehand (above), the count of un-detecting of said perents station, if said 1st assumed parents station and said 2nd assumed parents station are parents station and said and assumed parents station and is sent out from said 3rd assumedsaid packet of interference detection stiffed from the timing in the slot of said 1st assumedof said child office. The summary of this invention according to claim 2 said 6th process When for collision control of going down from return and said 1st assumed—parents station in actuation evasion approach characterized by having the 7th process which receives said direction packet channel of said 1st essumed parents station, and consists in the asymphronous interference new assumed percute station at said 6th process. It hope to the channel corresponding to the with the random number, When said 3rd assumed-parents station hops to a channel with said 1st station has recognized reception of said packet of interference detection, and was computed for collision control of going down from happing to the channel which seid 2nd assumed parents assumed parents station. Or the 8th process which evoids interference of said direction packet eccordance with the timing in the receiving slot in said and assumed-parents station, or said 1st said 3rd assumed parents station Soid fot assumed parents station, Whee sent out in detection, and the 5th process sent out continuously, Said packet of interference detection from the transmitting slot corresponding to said detected slot in the packet for interference it has interfered between said let assumed-parents station, when said slot which corresponds at said 4th process is detected. The count (more than) exceeding the threshold beforehand set as corresponding slot was detected. Said 3rd assumed parents station judges it as the slot in which

section and said 2nd assumed-parents station interfere, the RF section which performs the decision in which said 1st essumed-parents station in said ad hoc protocol processing set up beforehand respectively (more than), it is judged that interference has arison in said the un-detecting in said count storage section of unique HORD un-detecting exceed the threshold going down in said number storage scotten of receive packets and the count of unique WORD said unique WORD. When the count of reception of said direction packet for collision control of assumed-parents station, Said TDMA-TDD processing section of said child office carnot detect ist assumed parents station and said child office. Said TDMA-TDD processing section Based on said essumed-parents stations which transmit information to said child office, and other 2nd (more than), it is judged that interference has arisen in the easumed parents stadion of [1st count storage section of error detaction exceed the threshold set up beforehand respectively storaga section of receive packets and the count of error detection of the receive packet in said the count of reception of said direction packet for collision control of going down in said number the synchronization with seid assumed parents station and said child office is detected. When protocol processing section Seid unique WORD for seid TDMA-TDD processing section to take more child offices which can operate said assumed parents office temporarily. Said ad hoc section which computes the charmel which generates a random number and hops. It has two or control of going down sent out from the essumed perents station of said network has was undetection produced in the pecket which received. It has the hop place channel calculation detecting. The count storage section of error detection which memorizes the count of error which mamorizes the count from which the unique WORD which the direction packet for collision memorizes the packet which received. The count storage section of unique WORD un-detecting in an ad hoc network. The number storage section of receive packets which counts and processing section. The ad hoc protocol processing section which processes the protocol used generates a periodic pulse signal and is supplied to said RF section and said TDMA-TDD system in a network, and performs processing about TDMA-TDD, The clock section which the summary of this invention according to claim 12 is an asynchronous interference evasion approach according to claim 1 to 10 was recorded. The TDMA-TDD processing section which processing in said 5th process. The summary of this invention according to claim 11 consists in the storage with which the program which can perform the asynchronous interference evasion interference evasion approach according to claim 1 to 9 characterized by not performing charmal hop is carried out to said 2nd assumed-parents station, it consists in the asynchronous parents station. Or when this 11th process is performed including the 11th process to which channel change demand by the transmitting slot corresponding to said slot, said let assumedrepostedly detected in the range which can detect electric field. By sending out the packet of WORD is detected when said unique WORD is not detected When said unique WORD is investigates whether the location of said slot is shifted before [a bit of] "1", and said unique is detected, it investigates whether seid unique WORD is detected. The actuation which summary of this invention according to claim 10 said 4th process When said corresponding slot characterized by not performing processing in said the 4th process and said 5th process. The consists in the saynchronous interference evasion appreach according to claim 1 to 8 When this 10th process is performed including the 10th process sent out continuously, it used when said child office operated as 3rd assumed parents station temporarily (more than), summary of this invention according to claim 9 said 3rd process The count exceeding the count of error detection of said packet is below the threshold (following) set up beforehand. The threshold beforehend set up in seld packet of interference detection by ell the slots that can be collision control of going down is below the threshold (following) set up beforehand, or when said process returning to said 1st process when the count of reception of said direction packet for asynchronous interference evasion approach according to claim 1 to 7 characterized by said \$th to 8 to carry out. The summery of this invention according to claim 8 consists in the beforehand. It consists in the asymphronous interference evasion approach according to claim ? when the count of un-detecting of said unique WORD is below the threshold (fallowing) set up packet for collision control of going down is below the threshold (following) set up beforehend, or description about returning to said 1st process, when the count of reception of said direction

JP,2001-358842A (DETAILED DESCRIPTION)

addition to the value of said number storage section of receive packets for every non-detected osynchronous interference evasion system according to claim 12 characterized by storing "1" to unique WORD from said unique WORD Banking Enspection Department. Or it consists in the for every error indication of a receive packet from said error detection section. Detection of said detecting. "I" is added and stored in the value of said count storage section of error detection detected notice of said unique WORD from said unique WORD Banking Inspection Department investigate seid received field strength. Seid ad hoc protocol processing section For every nonreceived in said frame processing section, it has a field strength investigation means to "I" is added and stored in the value of said count storage section of unique WORD un-Inspection Department which detected delivery and said unique WORD for the pecket which The error detection section which roceives a receive packet from the unique WORD Sarking detection was notified to said ad hoc protocol processing section and an error is not detected, processing section, and] whether there is any error in a receive packet. When the result of error R investigates [the unique WORD Banking Inspection Department which notifies to the TOKORU said unique WORD was detected from the receive packet, and said unique WORD was detected. bit string received from said RF section, and was received from said frame processing section specified, and is passed to said RF section. He is said ad hoo pro about the result of whether processing section. The sist processing section which embeds into the sist which had the processing section among the packets received from said RF section to said ad hoc pretocol processing section which passes only the packet which is related to said ad hoc protocol transmitting packet which took out the receive packet of the slot specified out of the receiving summary of this invention according to claim 13 said TDMA-TDD processing section The frame station as return and said child office in actuation by the function of said child office. The reactiving said direction packet for collision control of going down from said 1st assumed parents perents station, it consists in the esynchronous interference evasion eystem characterized by channel hap, after hopping to the channel corresponding to the channel of said list essumedcomputed. Said 3rd assumed perents station When said 1st assumed parents station carries out channel which generates a random number and hops to a degree is order to avoid interference is interference detection is judged as an error packet by which the error was detected. The unique WORD of said packet of interference detection un-detecting. Or when said packet of interference detection is judged in said 2nd essumed-parents station. Or when it judges said to a degree is computed. Said 1st assumed-parents station, Or when reception of said packet of assumed parents station. The channel which generates a random number respectively and hops channel change demand which received in said 1st assumed parents station and said 2nd obtained. And said hep place charmel calculation section it is based on said packet of the transmitting stat corresponding to the slot from which the strongest received field strength is interference detection is continuously sent out the number of times set up beforehend from the beforehand set up out of the elet in all the frequencies that are operating by the function of the 3rd assumed-parents station temporarily, and are used is exceeded (with above). The packet for station in said ad hop protocol processing section, and said child office. The threshold assumed-parents station. It is based on decision of interference with said list assumed parents of a channel change demand is sent out to said 1st assumed paranta station and said 2nd transmission and reception, modulation, and recovery of an electric wave is minded. The packet

e detail based on a drawing. Embodiment of the Invention] Hereafter, the postalt of operation of this invention is explained to

network where the assumed-parents office 101 exists. two or mare child offices 110, [11, and 112, and is an assumed-parents office mediation mold configuration is carried out and can sesses on that spot in the assumed parents office (0) and operation. As shown in <u>drawing.</u>] , Network A is an ad hoo network which on outline performing the asynchronous interference evasion approach concerning the gestalt I of this [0015] (Gestalt 1 of operation) $\underline{Drawing}$ $oldsymbol{1}$ is drawing showing the outline of Network A of

[0016] The Internal configuration of the assumed-parents station 101 and the child offices 110,

configuration]. One set becomes the assumed parents office 101 out of two or more office child offices 110, 111, and 112. equipments, and <u>drawing 1</u> shows the condition that other office equipments are functioning as 111, and 112 is the same, and it calls these station equipment collectively [the internal

[D017] Next, the synchronization with the assumed perents station 101 and the child office 110

showing the synchronization between the assumed parents office 101 of drawing 1, and the Or represents out of the child offices 110, 111, and 112) is explained. Drawing 2 is drawing

operates to the slot timing of easumed-perents station 101 itself. parents station 101 does not carry out taking the child office 110 and a synchronization, but multiplex number is "4," In Network A one slot per ad had network A is used. The ascumed-[0018] The communication link between the assumed-parents station 101 and the child office 110 uses TDMA-TOD (Time Division Multiple Access-Time DivisionDuplex), and a TDMA

and so that the receiving slot 115 of the assumed parents station 101 and the transmitting slot assumed parenta station 101 and the receiving stot 117 of the child office 110 may correspond 118 of the child office 110 may correspond (0019) The child office 110 takes a synchronization so that the transmitting slot 114 of the

with possibility that two or more child offices 110, 111, and 112 send out a packet to stet 115 of the assumed parents station 101, the assumed parents station 101 needs to copa [0020] In order for two or more child offices 110, 111, and 112 to share one slot in the receiving

is called hereafter) CP is always sent out to the child offices 110, 111, and 112 using the collision control and the direction packet (the direction packet for collision control of going down technique is used as the control approach of such a collision. In ICMA-PE it gets down for [D021] In Network A, the ICMA-PE (Idle-signal casting multiple access with pertial echo)

out from an information signal 202, the free line / prohibition bit 203, reception / non-receiving bit 204, the partial each field 205, and the error detection field 208. control of going down gats down with unique WORD 201, and an outline configuration is carried control of deming 2 of going down. As shown in deswing 3, the direction packet CP for collision [0022] <u>Drawing 3</u> is drawing showing the configuration of the direction packet GP for collision

parents station 101 to the child offices 110, 111, and 112 A free line / prohibition bit 203 forbidding access from other child offices, it is used. displays "prohabition", when data are being received from a specific child office, and when beforehand. It gets down and an information signal 202 is data transmitted from the assumed-[0023] Unique WORD 201 is the field for taking a synchronization, and is the bit pattern set up

receiving during signal transmission, the child offices 110, 111, and 112 under data packet corrected, nor the signal is received, it indicates "un-receiving." When it indicates "untransmission halt transmit information, and go into a resenting procedure. received correctly, and when neither the case where there is an error which cannot be [0024] Reception / non-receiving bit 204 displays freception, when a signal without an error is

received correctly. The error detection field 208 does not have an error in the packet which received, or is used for a check information which the local station sent, and the information which the local station sent is offices 110, 111, and 112 collete the information on this periel echo field 205, and the [0025] The partial echo field 205 judges whether some received data are displayed, the child

coffision control of going down is continuously sent out using the channel [any] [0027] Drawing ϕ is the block diagram showing the outline configuration of the child offices $\{10,$ when building an ad hoc network and comes out (it is vecent and) the direction packet CP for whether the assumed parents station 101 is vacant, comes cut and there is about each charvel waves, and each frequency, a total of 12 channels exist, when it is judged that it investigates [0028] in Network A since the frequency which can be used can use four stats to those with 3

equipment is carried out from the RF section 301, the clock section 302, the TDMA-TDD 111, and 112 of $extit{traving 1}$. As shown in $extit{design 4}$, the outline configuration of the office

it to the RF section 301 and the TDMA-TDD processing section 300. modulation, and a recovery. The clock section 302 generates a periodic pulsa signal, and supplies [0028] The RF section 301 performs transmission and reception of an electric wave, a 305 of receive packets, the count storage section 308 of unique WORD un-detecting, the count processing section 303, the ad hoc protocol processing section 304, the number storage section storage section 307 of error detection, and the hop piace channel calculation section 308.

the frame processing section 3034, and the field strongth investigation means 3005, and performs processing about TOMA-TDD. 3031, the unique WORD Banking inspection Department 3032, the error detection section 3033, [0028] The TDMA-TDD processing section 303 is equipped with the slot processing section

specified, end is passed to the RF seation 301. received from the RF section 301, and was received from the frame processing section 3034 packet which took out the receive packet from the slot specified out of the receiving bit string [0030] The slot processing section 3031 is ambodded into the slot which had the transmitting

section 3003 when unique WORD 201 is detected. the ed her protocol processing section 304. A receive pecket is passed to the error detection The packet which received. The result of whether unique WORD 201 was detected is notified to [0031] The unique WORD Banking Inspection Department 3032 detects unique WORD 201 from

protocal processing section 304. related to the ad hoo protocol processing section 304 among the received packets to the ad hoc error is not detected. The frame processing section 2034 passes only the pecket which is section 304. The packet which received in passed to the frame processing section 3034 when an which received. The result of error detection is notified to the ed hoo protocol processing [0032] The error detection section 3033 investigates whether there is any error in the packet

which unique WORD 201 was un-detecting at the prodetermined period. network. The number storage section 305 of receive packets counts and memorizes the packet [0034] The count storage section 308 of unique WORD un-detecting memorizes the count from which received. The field strength investigation means 3035 investigates received field strength. [0033] The ad hoc protocol processing section 304 processes the protocol used in an ad hoc

and 112, a rendom number is generated using ID of the assumed-parents station 101 reported ID assigned uniquely every assumed parents office 101. In the case of the child offices 110, 111, case of the essumed-parents office 101, a random number is generated by making into the base should hop to the degree in the case of hopping to other channels using a random number. In the occurred Enishes. The hop place channel calculation section 308 computes the channel which and the count storage section 307 of error detection if decision whether this interference has seation 305 of receive packets, the count storage section 308 of unique WORD un-detecting from the essumed-parents station 101. ectuation of interference evasion will be taken. "O" will be set to each of the number storage to which those values were set beforehand, it will judge that interference has occurred and storage section 307, of error detection. If it is beyond the predetermined value (for example, 120) memorized by the court storage section 308 of unique WORD un-detecting, and the count example, 240) set up beforehend, the ed has protocol processing section 304 reads the velue number storage section 305 of receive packets, and the value is egain stored in the number detection. Moreover, if the notice which is not detected [detection or] is received from the unique WORD Banking Inspection Department 2032, "I" is edded to the value stored in the storage section 305 of receive packets. When this value turns into a predetermined value (for of error detection, and the value is again stored in the count storage section 307 of error error detection section 3033, "1" is added to the count stored in the count storage section 307 un-detecting. Moreover, if it is notified that there was an error of a receive packet from the un-detecting, and the value is again stored in the count storage section 308 of unique HORD 3002, "1" is added to the count memorized by the count storage section 308 of unique WORD ed has protocal processing section 304 from the unique WORD Benking Inspection Department produced at the predatermined period. If wre-detecting [of unique WORD 201] is notified to the (DV35) The count storage section 307 of error detection memorizes the count of error detection

JP,2001-358642A (DETAILED DESCRIPTION)

CP for collision control of going down from assumed-parents office 101A and assumed-parents operation, and the child office 110. As shown in drawing \underline{b} , it is drawing showing the case where the child office 110 is located in the location which can receive respectively the direction packet office) 1018 in the asynchronous interference evasion system concerning the gestalt 1 of this office (1st assumed parents office) 101A and assumed parents office (2nd assumed parents [0038] <u>Drawing 5</u> is drawing showing on example of the physical relationship of assumed parents

evasion system concerning the gestalt 1 of this operation. (0037) $\underline{Draving.6}$ is a flow chart which shows the actuation in the asynchronous interference

3rd case where do not synchronize but the direction packet GP for collision control of going completely the same, Assumed-parents station 101A and assumed-parents station 101B are the parents station 101A and assumed parents station 101B completely synchronize, and are transmitted to the timing that the direction packet GP for collision control of going down is down to the child office 110 has caused asynchronous interference. going down using the same channel The 2nd case where transmission and reception of assumedessumed-percuts station 1018 have sent out the direction packet CP for collision control of essumed-parents station 101A. In the condition that assumed parents station 101A and communicate, assumed parents station 1018 carries out channel frop at the same channel as channel to the child office 110, While essumed-perents station 101A and the child office 110 have transmitted the direction packet GP for collision control of going down by the separate [0040] The 1st case where essumed parents station 101A and assumed parents station 101B packet CP for collision control of going down from assumed parents station 101A ere explained [0039] The following three cases in case the child office 110 is gaing to receive the direction of this operation with reference to <u>drawing 5</u> and <u>drawing 6</u> is explained in detail. [0038] Next, actuation of the asynchronous interference evasion system applied to the gastelt

of going down from assumed-parents station 101A the unique WORD Banking Inspection Depertment 3002 detects unique IMORO 201, and the error detection section 3003 is the case separate channel and the child office 110 receives the direction packet CP for collision control where an error is not detacted. 101B have transmitted the direction packet CP for collision control of going down by the [0041] When, as for the 1st case, assumed-parents station 101A and assumed-parents station

is passed to the ad hoc protocol processing section 304 (step 405). and, in the case of the packet related to the ad hoc protocol processing section 304, the packet [0046] In the farme processing section 3034, the class of packet which received is investigated 3034 by that (inside of drawing, No) by which an error is not detected (step 404). [0045] in this case, the sent packet (receive packet) is passed to the frame processing section error datection section 3003 in delivery and the arrar detection section 3003 (step 403). that the child office 110 has taken assumed-parents station 101A and a synchronization, and judges whether the error was detected by the pecket by which this packet has been sent to the [0044] In this case, since unique WORD 201 is detected (inside of drawing, Yes), it recognizes WORD 201 (shown in drawing 2) set up beforehand is detected (step 402). [0043] The unique WORD Banking Inspection Department 3002 investigates whether unique packet which received is sent to the unique WORD Banking inspection Department 3032. [0042] first — the slot processing section 3031 — a packet — receiving (step 401) — the

the child office 110 are shown. station 1018, the receiving slot 115, end the transmitting slot 116 and the receiving slot 117 of drawing, the transmitting stot 114 of assumed-parents station 101A and assumed parents [0048] Diswing 7 is drawing showing an example of a condition synchronous [in drawing 6] Next, the 2nd case is explained with reference to <u>drawing 5</u> , <u>drawing 6</u> , and <u>drawing 7</u> . All over acconfing to a receive packet is performed in the ad hoc protocol processing section 304)) operates according to actuation of an ad hoc protocol henceforth (step 406 (processing [0047] The ad hoc protocol processing section 304 investigates the received packet, and

out the direction pecket CP for collision control of going down using the same channel [0049] Although assumed parents station 101A and assumed parents station 101B have sent

[0050] in this case, the child effice [110 — the dot processing section 3031 — a packet of going down is sent out to the completely same timing is explained 1018 completely synchronize, and the case where the direction packet CP for collision control transmission and reception with assumed parents station 101A and assumed parents station

[0051] The unique WORD Banking Inspection Department 3032 investigates whether exique receiving (step 401) — the packet which received is sent to the unique WORD Banking Inspection Department 3032

WORD 201 set up beforehand is detected (step 402)

the unique WORD Benking Inspection Department 3002 is sent to the error detection section of drawing. Yea) which can detect unique WORD 201, it recognizes that the child office 110 has taken assumed percents station 101A and a synchronization, and the packet which received in the direction packet CP for collision control of going down is the same. Therefore, by that finside assumed-parents station 101A and assumed-parents station 101B, since unique WORD 201 of to the completely some timing, and the signal of unique WORD 201 part deforming from parents station 101A and assumed-parents station 101B can be received, without being sent out [0052] In this care, the direction packet CP for collision control of going down from assumed-

and notifies that the error was detected to the ad has protocol processing section 304 (step that by which an error is detected in the error detaction section 3033 (inside of drawing, Yes), the signal of assumed-perents station 101A and assumed-perents station 101B interfered, it is peaket (step 403). Since the peaket which received turns into a peaket with which the signal of [DD53] In the error detaction section 3033, it judges whather the error was detected by the sent

of error detection. section 307 of error detection (step 408), and stores the value in the count storage section 307 section 304 acts "1" to the count of error detection currently recorded on the count storage [0054] If the notice by which the error was detected is received, the ad hoc protocol processing

(step 409 (the value stored in the number storage section 305 of receive peckets exceeded the section 305 of receive packets exceeded the threshold (for example, 240) set up beforehand [0055] This condition is repeated and it judges whether the value stored in the number storego

[1055] When it is not over the threshold at step 409 (inside of drawing, No), it returns to step

(for example, 120 times) (step 410 (the count of error detection exceeded the threshold ?)). [0058] When it is not over the threshold at step 410 (inside of drawing, No.), it returns to step value of the count storage section 307 of error detection exceeded the predetermined threshold [0057] When a threshold is exceeded at step 409 (Inside of drawing, Yea), it judges whether the

random number, and perform channel hop respectively. channel change demand CSI packet compute the channel which should top to a degree using a (9060) Assumed parenta station 101A and assumed parents station 101B which received assumed parents station 101A and assumed parents station 101B (step 411). processing section 204 to the slot processing section 3031 through the RF section 301 towards send out channel change demand CSI packet for the packet from the ad hoo protocol delivery and the frame processing section 3034 Defivery and the sidt processing section 3031 interference has produced the ed hoc protocol processing section 304. As opposed to the frame processing section 3034 the packet of the channel change demand CS I (shown in <u>drawing 7</u>) [0059] When e thrushold is exceeded at step 410 (inside of drawing, Yes), it is judged that

explain the 3rd case where the direction packet CP for collision control of going down has essumed-parents station 101A and assumed-parents station 101B do not synchronize, but for collision control of going down to the child office 110 using the same channel, and further, parents startion 101A and essumed-parents station 101B have sent out the direction packet CP The 3rd case is explained with reference to <u>drawing 5 , drawing 6</u> , and <u>drawing 8</u> . Assumed-[0061] <u>Denting 8</u> is drawing showing other examples of a condition synchronous [in <u>drawing 6</u>]

JP,2001-358642,A [DETAILED DESCRIPTION]

caused asynchronous interference

401) — the packet which received is sent to the unique WORD Banking Inspection Department [0082] the child office 110 — the slot processing section 3031 — a packet — receiving (step

WORD 201 set up beforehand is detected (step 402). [0063] The unique WORD Banking Inspection Department 3032 investigates whether unique

that unique WORD 201 was undetectable to the ad hoc protocol processing section 304 (step eyrichronization (essumed-parents station 1018 cannot take a synchronization), and it notifies drawing). It becomes impossible to take No.), assumed parents studion 101A, and a for collision cantrol of going down which received set up beforehend is undetectable (among sent out to the same timing. In the child effice 110 Unique WORD 201 in the direction packet CP [0044] The direction packet CP for collision control of going down from assumed parents station 101A and assumed-parents station 101B it interfers in the form which shifted without being

seotion 306 of unique WORD up-detecting)). detacting again (step 413 (t is added to the count currently recorded on the count storage unique WORD un-detecting, and stores it in the pount storage section 308 of unique WORD un-'i" to the count of unique WORD un-detecting stored in the count storage section 306 of WORD Banking Inspection Department 3032, the ad hoc protocol processing section 304 adds (0065) If the notice which was not able to detect unique WORD 201 is received from the unique

of drawing, No.), it returns to step 401. WORD un-detecting exceeded the threshold ?)) and is not over the threshold at step 415 (Inside threshold was exceeded at step 414 (inside of drawing, Yes) (step 415 (the count of unique detecting of ** exceeded the threshold (for example, 120 times) set up beforehand when a over the threshold et step 414 linside of drawing. No.), it returns to step 401 [0067] When it judges whether the value of the count storage section 306 of unique WORD unwhether the threshold (for example, 240) set up beforehand was exceeded (step 414) and is not [0066] When the value stored in the number storege section 305 of receive peakets judges

3rd assumed parents station, I) temporarily (step 416), and it enables it to transmit and receive to its slot timing synchronization, the child office 110 turns into an assumed parents station (un-disstrating [the 110 is assumed parants station 101A (). Or it stops taking assumed parents station 1018 and e section 304, when a threshold is exceeded at step 415 (inside of drawing, Yes), the child office [0063] Judying that asynchronous interference has produced the ad hoe protocol processing

interference condition into the transmitting stot 116 corresponding to this slot — it sends out continuously (step 419 (continuation 120 stat sending out of the "interference detection" packet station 1019 has interfered mutually. the count more than the threshold (for example, 120 times) CP for collision control of guing down from essumed-parents station 101A and assumed-parents beforehand set as it in the packet of the interference detection D1 in order to recognize an assumed parents station The detected slot judges it as the slot in which the direction pecket [0071] When the slot backed for at step 418 is datected (Inside of drawing, Yes), the 3rd (0070) It judges whether the slot looked for at step 417 was found (step 418). investigated and the slot of a heavy current community is looked for most the strongest received field strongth is obtained (step 417), (the field strength of all slots is received field strength in all the slots of the frequency currently used is investigated, and the field strength more than the threshold (for example, 40vB) set up beforehend is detected, and temporarily, the field strength investigation means 3035 books for the slot from which the [0069] Next, in the child effice 110 which turned into the 3rd essumed parents station

recognize the packet of the interference detection D1. Therefore, assumed parents station 101A D1 is able to be sent out, assumed-parents office 101A or assumed-parents office 101B can which has recognized the packet of the interference detection D1, or assumed parents station receiving stat 115 of essumed-parents office 1018 and the packet of this interference detection [0072] When it is completely in agreement with the timing in assumed parents office 101A or the

direction packet CP for collision control of gaing down. computed (step 420), hops to the acquired channel (step 421), and avoids interference of the 1018 ecquires the channel of the hop place which the hop place charmal calculation section 308

Assumed-perents station 101A which has recognized interference, or assumed-perents station period set up beforehend in the non-detected packet of unique WORD 201 — It recognizes. out, it is the slot in which it has interferred more than the threshold (for example, 120) with which parents station 1018, and unique WORD 201 is un-detecting count reception, when it carries computed (stop 420), and hops to the sequired channel. 101B acquires the channel of the hop place which the hop place channel calculation section 308 essumed-parents station 101A or assumed-parents station 101B was beforehend set as the dotection D1 is sent out at step 419, it is with assumed paranta station 10fA and assumedparents station 101A and assumed parents station 101B and the packet of the interference [0073] On the other hand, when it shifts from the timing in each receiving slot 115 of assumed-

of essumed-parents station 101A to which the hop place channel calculation acction 308 is assumed parents station temporarily elso generated and computed the random number using ID [0074] The channel of the hop place of which similarly the child office 110 which is the 3-d

reported from essumed-perente stetion 101A is sequired, and it hops to the acquired channel

down from assumed-parents station 101A again. office) (step 422), and tries reception of the direction packet CP for collision control of going [0075] The 3rd assumed parents station returns to the child office 110 (it becomes a child

received field strength of all abots is investigated again. the timing of a slot is shifted a secricincle term (step 424), it returns to step 417, and the has finished judging at step 418 when the dot looked for is undetectable finaide of drawing. No, [0078] If it judges that it was finished whether conducting all stat investigations (step 423) and

the child office 110 as mentioned above. [0078] Asynchronous interference evasion is made between assumed parents station 101A and [0077] Processing is ended when finishing judging at step 423 (Inside of drawing, Yes).

offectiveness hung up over below is done so. ovasion system concerning the gestalt of operation are constituted like the above, the (0079) Since the asynchronous interference evasion approach and asynchronous interference

gostalt 2 of this operation is the same as that of the gestalt 1 of operation, explanation is operation] Since the asynchronous interference evasion structure of a system concerning the synchrangus (in the asynchronous interference evasion system concerning the gostalt 2 of this [DD81] (Gestalt 2 of operation) Drawing 9 is drawing showing an example of a condition esynchronous interference evasion approach for the manitoring device of the child office 110. wave in the natwork A equipped with many child offices is finely manageable by using this ssynchronous interference evesion is enabled by the positive approach. The received electric recognizes interference by interference produced by interference detection packet sending out, charmel hop because assumed-perents station 101A or assumed parents station 1018 since assumed-parents station 101A or assumed-parents station 101B is made to perform [whether assumed-parants stution 101B recognizes on interference detection packet and] Or which sent out the interference detection packet and has caused asynchronous interference, Or strength and by the transmitting slot corresponding to the slot Assumed parents station 101A [0080] When asynchronous interference is detected, discover the highest slot of received field

[0034] (Gastoft 3 of operation) $\underline{Draxing \, heta}$ is drawing showing an axampte of a condition this actuation compared with the gostalt 1 of operation. for a slot with the strangest received field strength. Explanation of other signs is omitted. interference detaction D1 is each out by all slots, it becomes unnecessary in this case, to look out by the transmitting slot corresponding to the slot, as shown in <u>drawing 9</u>, the packet of the octuation after step 417 in <u>drawing 0</u> and the packet of the interference detection D1 was sent [0083] Charmel hop can be made to cause in an assumed-parents office cortainly by performing [0082] Although the slot with the strongest received field strength was looked for in the

JP.2001-358642.A [DETAILED DESCRIPTION]

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gestalt 3 of this operation is the senne as that of the gestalt 1 of operation, explanation is operation $oldsymbol{1}$. Since the asynchronous interference evasion structure of a system concerning the synchronous [in the asynchronous interference evasion system concerning the gestak 3 of this

configuration, etc. are not limited to the gestatt of the above-mentioned implementation, but when cerrying out this invention, they can be made into a suitable number, a location, a applying this invention, it is applicable to the technique about the suitable asynchronous [1088] Moreover, the number of the above-mentioned configuration members, a location, a interference evasion approach and a suitable esynchronous interference evasion system without generating interference intentionally, and interference can be avoided. receiving slot 117, a channel can be enade to be able to hop to assumed parents office 101A [0087] to addition, in the gestalt of this operation, this invention is not limited to it, but when sending out the channel change demand GS I by the transmitting slot I I 6 corresponding to the 101A and the synchronization which transmit the unique WORD 201 can be taken. Therefore, by whether unique WORD 201 is obtained. If unique WORD 201 is obtained, assumed-parents office This actuation is repeated in the range which can detect electric field, and it investigates shifted before [a bit of] "I", and it investigates whether unique WORD 201 is detected again. will investigate whether unique WORD 201 is detected (un-illustrating) [0088] When unique WORD is not detected, as shown in drawing 10, the location of the slot is [0085] If a slot with the highest received field strength is acquired at step 418 in $\underline{drawing}$ $\mathfrak S$, it

[0089] In addition, in each drawing the same sign is given to the same component

effectiveness hung up over below is done so. [Effect of the Invention] Since this invention is constituted as mentioned above, the

in an interference detection packet, or is produced by interference detection packet sending out, and it is because an assumed parents station is made to perform channel hop. recognizes [station / which has been started in asynchronous interference / assumed parents slot corresponding to the discovered slot, sends out an interference detection packet, and that an essumed-parents station recognizes interference by interference which is a transmitting the highest slot of received field strength, when asynchronous interference is detected, and it is office, it is enabling asynchronous interference evasion by the positive approach. This discovers [0091] In the communication mode using TDMA-TDD which consists of a key station and a child

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TECHNICAL FIELD

(Field of the Invention) This invention belongs to the technique about the asynchronous interference evesion approach and asynchronous interference evesion system which avoid interference of the electric wave between a key station and a child office.

[Translation done.]

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PRIOR ART

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[0003] Description of the Prior Art] The method which avoids asynchronous interference to UP,7[0003] Description of the block degram showing an example of a method which avoids
esynchronous interference of the conventional technique. As shown in desking [1], this
conventional method consists of a wireless communication control unit 1, wireless contacts 2, 3,
and 5, and migration machines 8, 7, 8, and 9.
[0004] The wireless communication system, and the wireless circuit in a system,
public network or other mobile communication system, and the wireless circuit in a system,
migration management of the migration machines 6, 7, 8, and 9, and wireless management of a
and release of a wireless circuit with the migration machines 8, 7, 8, and 9 under enamagement of
through the wireless contacts 2, 3, and 5 and the wireless can build carrying out setup
the wireless communication control unit 1. The migration machines 8, 7, 8, and 9 under enamagement of
through the wireless contacts 2, 3, and 5 and the wireless communicate
moving in the inside of a system.

[Interference of the process of the system of the wireless control unit 1, and 5 and the wireless control unit 1,
[Interference of the process of the process of the wireless contacts 2, 3, and 5 and 4 the wireless contacts 2, 3, and 5 and 4 the wireless control unit 1,
[Interference of the process of the

[0005] The wireless zones 10A, 10B, 10C, and 10D are respectively set up to the wireless contacts 2, 3, 4, and 5,

[0008] <u>Denning 12</u> is the block diagram showing the configuration of the wireless contects 2, 3, 4, and 5 of <u>drawing 11</u>.

[0007] The wireless contacts 2, 3, 4, and 5 consist of antenna section 101X, the wireless section 102, the modern section 103, frame generation / decomposition section 104, the combrol channel interference detecting deement 107, the interface section 108, and a siot synchronous [0008] Drawing 11 is drawing showing the flow of the sectuation in the wireless communication and setuation with 1 of drawing the flow of the sectuation in the wireless communication and the wireless communication and the wireless contact 2 are lifted, and the wireless contact 2 carry out to it being under communication. The migration machine 8 frequency fl. The slot for reserve channels in this case, slot 4SI which is not usually used is channels. The information about this empty carrier is searched using this slot for reserve vacent, and is notified to the migration machine 6 as a notice of carrier information in this case, searched updated and notified.

[0008] In the measure of the property carrier is put on slot 2S under communication link is a frequency f2, slot 4S). When an empty carrier becomes unusable, a new empty channel is

[0009] In the meantime, the wireless contact 2 measures the receiving level of two or more points in stat 25 under communication that by the asynchronous interference detecting element 107, and reports the result to the communication channel control section 108, When the communication channel control section 108 performs seynchronous interference detection in to the communication channel fa frequency f2, stat 45) notified as empty carrier information. The receive, and changes it to the communication channel fa frequency f2, stat 45) notified as empty carrier information. The receive, and changes it to the communication channel (a frequency f2, stat 45) notified beforehand. In addition, forming the asynchronous interference detecting element 107 in the

migration machine 6 side, and also making it operate similarly is performed. All over drawing, slot 1S and alot 3S are shown, and other explanation is owritted. (0010) Moreover, in No. 253288 of a petent official report, the technique about the asynchronous interference evasion approach which becomes possible [detecting especially effectively exactly interference evasion approach which have made a from the back of the burst frame in the signal wave of choice of a digital mobile radio communication link of time—division system, and starting interference evasion actuation efficiently] is exhibited.

[Translation dama.]

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EFFECT OF THE INVENTION

[Effect of the Invention] Since this invention is constituted as mentioned above, the effectiveness hung up over below is done so.

[0091] In the communication mode with the transfer of the communication mode with the communication and the communication mode with the communication mode with the communication mode with the communication and the communication mode with the communication and the commun

[0091] In the communication mode using TDMA-TDD which consists of a key station and a child office, it is enabling asynchronous interference evasion by the positive approach. This discovers the highest stat of received field strength, when asynchronous interference is detected, and it is that an assumed parents station recognizes interference by interference which is a transmitting stot corresponding to the discovered slot, sends out an interference detection packet, and recognizes [station / which has been started in asynchronous interference / assumed-parents] in an interference detection packet, or is produced by interference detection packet sending out, and it is because an assumed parents station is made to perform channel hop.

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3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

Problem(s) to be Salved by the Inventional However, there was a treatble hung up over below in the conventional technique. When coping with the asynchronous interference between the wirefers contacts 2, 3, and 4 and 5 using the conventional asynchronous interference evasion method, an asynchronous interference detecting element will be prepared in the terminal side channel as for which the terminal side detected interference by the asynchronous interference which the terminal side detected interference by the asynchronous interference channel as for which the terminal side detected interference by the asynchronous interference side, the wireless contacts 2, 3, 4, and 5 will detect asynchronous interference, and will carry out channel hap. However, having consumed the power of a de-battery other than the factor as for terminal side is operating with the do-bettery carried out channel hap was also considered, and decision that interference generated and stopping receiving the signal from a terminal side.

[0012] This invention is made in view of this trouble, and the place made into the purpose is in the point of offering the technique about the synchronous interference evesion approach and asynchronous interference cortainly because an essumed-parents station makes a reception judgment of the packet for the interference detection transmitted from the child office in the essumed-parents station mediation add network where an assumed-parents station according to the packet for the interference for the essumed-parents station according to the packet for the interference activate where an assumed-parents station exists.

[Translation done.]

* MOTIONS .

STINES #

APO and ACHP1 are not reapposible for any danages caused by the use of this translation.

3.in the drawings, any words are not translated.

EAS

unique WORD et the period which could not detect said unique WORD but was set up counted exoceding the threshold set up beforehand (above), the count of un-detecting of said parents station. If said 1st assumed parents station and said 2nd assumed parents station are parents station and said 2nd assumed parents station and is sent out from said 3rd assumedsaid packet of interference detection shifted from the timing in the slot of said 1st assumedof said child office. The summary of this invention according to claim 2 said 6th process When evasion approach characterized by having the 7th process which receives add direction packet channel of said lot assumed perents station, and consists in the asynchronous interference for collision control of going down from return and said 1st assumed-parents station in actuation now assumed parents station at said 6th process, it hops to the channel corresponding to the with the random number, When said 3rd assumed parents station hops to a channel with said 1st station has recognized reception of said packet of interference detection, and was computed for collision control of going down from hopping to the channel which said 2nd essumed parents essumed parents station, Or the 6th process which evoids interference of said direction packet seid 3rd essumed-parents station Said list essumed-parents station, When sent out in eccardance with the timing in the receiving slot in said 2nd essumed-perents station, or said 1st detection, and the 5th process sent out continuously. Said packet of interference detection from the transmitting slot corresponding to said detacted slot in the packet for interference said 4th process is detected. The count (more than) exceeding the threshold beforehand set as it has interfered between said 1st assumed-parents station, when said slot which corresponds at corresponding slot was detected. Said 3rd assumed parents station judges it as the slot in which (above), and the strongest received field strength is obtained was looked for, and the threshold beforehand set up out of the slot in all the frequencies currently used is exceeded 3rd assumed parents station The 4th process which judges whether the slet from which the enables it to transmit and receive to the stot tisning of the 3rd assumed parents station, and temporary — as the 3rd assumed parents station — operating — this — the 3rd process it parents stetion, end it stops taking said 1st assumed-parents station and synchronization. count of un-detecting of said unique WORD exceed the threshold set up beforehend respectively (more than), Judge that asymphronous interference has arisen between said list assumed-Pitson the count of reception of said direction packet for collision control of going down and the process which counts the count of un-detecting of said unique WORD, and said child office differ, said chiad office When said unique WORD cannot be detected in said 1st process, the 2nd parents station and the 2nd assumed-parents station which is other assumed parents stations out respectively and it interferes in it mutually to the thing from which said let essumed going down was detected. When said direction packet for collision control of going down is sent unique WORD for a synchronization contained in this direction packet for collision control of station temporarily is said assumed parents station. The 1st process which judges whether the essumed parents station mediation mold network which can surve as an assumed-parents control of going down is received from the 1st assumed perents station whose child office of the asynchronous interference exession approach in a naturork. The direction packet for collision Means for Solving the Problem] The summary of this invention according to claim 1 is the

JP,2001-358842,A [MEANS]

the transmitting slot corresponding to said slot, spid 1st assumed-parents station, Or when this range which can doteot electric field. By sonding out the packet of a channel change demand by investigates whether said unique WORD is detected. The actuation which investigates whether the location of eads slot is shifted before [a bit of] "1", and said unique WORD is detected when said unique WORD is not detected When seid unique WORD is repeatedly detected in the bivention according to claim 10 said 4th process When said corresponding slot is detected, it performing processing in seld the 4th process and said 5th process. The summary of this asynchronous interference evesion approach according to claim 1 to 8 characterized by not said child office operated as 3rd assumed parents station tamporarily (more than). When this beforehand set up in seid peaket of interference detection by ell the slots that can be used when of this invention according to claim 9 said 3rd process The count exceeding the threshold error detection of said packet is below the threshold (following) set up beforehend. The summary 10th process is performed including the 10th process sent out continuously, it consists in the control of going down is below the threshold (following) set up beforehand, or when said count of relurning to said 1st process when the count of reception of said direction packet for collision interference evesion approach according to claim 1 to 7 characterized by said 9th process process. The summary of this invention according to claim 8 consists in the esynchronous interference evesion approach according to claim 1 to 8 characterized by returning to said 1st below the threshold (following) set up beforehend in **), it consists in the asynchronous set when the count of reception of said direction packet for collision control of going down was the threshold (sheep) to which the court of un-detecting of said unique NORO was beforehend had protocol. For seld 3rd process, the summary of this invention according to claim 7 is below characterized by including the process which operates according to actuation of the usual ad consists in the asymphronous interference evasion approach according to claim 1 to 5 is judged that said 1st assumed-parents station and synchronization have been taken since said child office detects said unique WORD and does not have detection of the error of a packet. It said direction packet for collision control of going down respectively by the separate channel, it characterized by including the 10th process which hops to the charmel respectively computed consist in the asynchronous interference evasion approach according to claim 1 to 4 When said 1st assumed parents station and said 2nd assumed parents station have sent out with the random number. The summary of this invention seconding to claim 6 said 1st process said 2nd assumed parents station receive the packet of said channel change demand, and perents station and said 2nd assumed-parents station. Said 1st assumed parents station and parents station, and sends out the packet of a channel change demand to said 1st assumedthan). The 9th process which judges that interference has arisen between said let assumedcount of error detection of a packet exceed the threshold set up beforehend respectively (more When the count of reception of said direction packet for collision control of going down and the station and the signal from said 2nd assumed-parents station interfered, an error is detected. WORD, and since it becomes the packet with which the signal from said 1st assumed parents control of gaing down respectively using the same channel. Said child office detects said unique 2rd assumed parents station have synchronized and sent out said direction packet for collision evasion approach according to claim 1 to 3 characterized by said 8th process including the invention according to claim 5 said tet process When said 1st assumed parents station and said process which ends processing when all the slote finish being investigated. The summary of this summary of this invention ecoording to claim 4 consists in the asynchronous interference roturns to seid 4th process which investigates the received field strength of ell slots. The evasion approach according to claim 1 or 2 characterized by including the 8th process which baing of said slot is shifted a seaticincle term and it consists in the asynchronous interference judges that it was finished whether investigating all the clots and has finished investigating The corresponds at said 4th process cannot be detected, said 3rd assumed-parents station If it summary of this invention according to olsim 3 said 5th process When said slot which process which hops to the channel respectively computed with the rendom number. The esynchronous interference evasion approach eccording to claim 1 characterized by including the beforehand it judges respectively that it is the slot in which it has interfered, and consists in the

office in actuation by the function of said child office. The summary of this invantion according collision control of going down from said 1st assumed-parents station as return and said child esynchronous interference evasion system characterized by receiving said direction packet for the charmal corresponding to the charmel of said 1st assumed parents station, it consists in the number and hops to a dagree in order to svoid interference is computed. Said 3rd assumedparents station iffien said 1st assumed parents station carrias out channel hop, efter hopping to as an error packet by which the error was detected. The channel which generates a random of interference detection urr-detecting. Or when said packet of interference detection is judged judged in said 2nd assumed-parents station. Or when it judges said unique WORD of said packet channel which generates a random number respectively and hops to a degree is computed. Said 1st assumed parents station, Or when reception of said packet of interference detection is which received in said 1st essumed parents station and said 2nd assumed parents station. The hop place channel estoutation section it is based on said packet of the channel change demand corresponding to the slot from which the strongest received field strength is obtained. And said is continuously sant out the number of times set up beforehand from the transmitting slot station temporarily, and are used is exceeded (with above). The packet for interference detection the slot in all the frequencies that are operating by the function of the 3rd assumed parents hoc protocol processing section, and said child office. The threshold beforehand set up out of station. It is based on decision of interference with seld 1st assumed parents station in seld ad charge demand is sent out to said 1st assumed parents station and said 2nd assumed parents reception, modulation, and recovery of an electric wave is minded. The packet of a channel and essumed parents station interfers, the RF section which parforms transmission and in which said 1st assumed parents station in said ad hoc protocol processing section and said parents station and said child office. Said TDMA-TDD processing section Besed on the decision respectively (more than), it is judged that interference has arisen in said the 1st assumedstorage section of unique WORD un-detecting accord the threshold set up beforehand storage section of receive packets end the count of unique WORD un-detecting a said count count of reception of said direction packet for collision control of gaing down in said number TDMA-TDD processing section of said child office cannot datect said unique WORD. When the which transmit information to said child office, and other 2nd assumed parents station. Said interference has arisen in the assumed-parents station of [1st] said assumed-parents stations detection exceed the threshold set up beforehand respectively (more than). It is judged that the count of error detection of the receive packet in said count storage section of error packet for collision control of going down in said number storage section of receive packets and parents station and said child office is detected. When the count of reception of said direction said assumed parents office temporarily. Said ad hoc protocol processing section Said unique which generates a random number and hops. It has two or more child offices which can operate out from the assumed-parents station of said network has was un-detecting. The count storage WORD for said TDMA-TDD processing section to take the synchronization with said assumedwhich received, it has the hop place channel calculation section which computes the channel section of error detection which memorizes the count of error detection produced in the packet from which the unique WORD which the direction packet for collision control of going down sont received. The count storage section of unique WORD un-detecting which memorizes the count number starage section of receive packets which counts and memorizes the packet which protocal processing section which processes the protocal used in an ad had network. The signal and is supplied to said RF section and said TDMA-TDD processing section. The ad hoc performs processing about TDMA-TDD, The clock section which generates a periodic pulse secording to claim 12 is an asynchronous interference evesion system in a network, and was recorded. The TDMA-TDD processing section which the summary of this invention which can perform the asynchronous interference evasion approach according to claim 1 to 10 summary of this invention according to claim 11 consists in the storage with which the program eccording to claim 1 to 9 characterized by not performing processing in said 5th process. The and essumed-parents station, it consists in the asynchronous interference evesion approach If th process is performed including the 11th process to which channel hop is carried out to said

JP,2001-358642,A [MEANS]

storage section of receive packets for every non-detected notice. occording to obim 12 characterized by storing "1" to addition to the value of said number Banking Stapection Department, Or it consists in the asynchronous interference evasion system from said error detection section. Detection of said unique WORD from said unique WORD of said count storage section of error detection for every error indication of a receive packet said count storage section of unique WORD un-detecting. "1" is added and stored in the value from said unique WORD Banking Inspection Department "1" is added and atored in the value of Said ad hos protocol processing section For every non-detected notice of said unique WORD section. It has a field strength investigation means to investigate asid received field strength. dstacted delivery and said unique NORD for the packet which received in said frame processing receives a receive packet from the unique WORD Banking Inspection Department which protocol processing section and an error is not detected. The error detection section which any error in a roceive pecket. When the result of error detection was notified to said ad hac Inspection Department which notifies to the TOKORU processing section, and] whether there is packet, and seid unique WORD was detected. It investigates (the unique WORD Banking seid ad hoo pro about the result of whather said unique WORD was detected from the receive received from said frame processing section specified, and is passed to said RF section. He is packet of the slot specified out of the receiving bit string received from said RF section, and was soction which embeds into the slot which had the transmitting packet which took out the receive received from said RF section to said ad hoo protocol processing section. The stot processing the packet which is related to said ad hoo protocol processing section among the packets to claim 13 said TDMA-TDO processing section The frame processing section which passes only

 detail based on a drawing. [Embodiment of the Invention] Hersafter, the gestalt of operation of this invention is explained to

two or more child offices 110, 111, and 112, and is an assumed perceits office mediation mold configuration is carried out and can ******** on that spot in the assumed parents office 101 and operation. As shown in drawing 1, Notwork A is an ad hoc network which an outline notwork where the assumed-parents office 101 exists. performing the esynchronous interference evesion approach concerning the gestaft 1 of this [0015] (Gestalt 1 of operation) <u>Premine 1</u> is chawing showing the outline of Notwork A of

child offices 110, 111, and 112 equipments, and drawing I shows the condition that other office equipments are functioning as configuration 1. One set becames the assumed parents office 101 out of two or more office 111, and 112 is the same, and it calls these station equipment collectively [the internal [D016] The internal configuration of the assumed-parents station 101 and the child offices 110,

child office 110. showing the synchronization between the assumed-parents office 101 of $extit{drawing.} 1$, and the Or represents out of the child offices 110, 111, and 112) is explained. <u>Drawing 2</u> is drawing [0017] Next, the synchronization with the assumed-parents station 101 and the child office 110

operates to the slot timing of assumed perents station 101 itself. perents station 101 does not carry out taking the child office 110 and a synchronization, but multiplies number is "4." In Network A, ozo stot per ad hoc network A is used. The assumed-[0018] The communication link between the assumed perents station 101 and the child office 110 uses TDMA-TDD (Time Division Multiple Access-Time OvisionDuplan), and a TDMA

and so that the receiving slot 115 of the assumed-parents station 101 and the transmitting slot assumed parents station 101 and the receiving slot 117 of the child office 110 may correspond [0018] The child office 110 takes a synchronization so that the transmitting slot 114 of the 116 of the child office 110 may correspond.

with possibility that two or more child effices 110, 111, and 112 send cut a packet to slot 118 of the assumed parents station 101, the assumed parents station 101 needs to cope [0020] In order for two or mans child offices 110, 111, and 112 to share one slot in the receiving

[0021] In Network A, the ICMA-PE (idle-signal cesting multiple access with partial echo)

is called hereafter) CP is elimays sent out to the child offices 110, 111, and 112 using the callision control and the direction packet (the direction packet for collision control of going down technique is used as the control approach of such a collision. In ICHA-PE, it gets down for

out from an information signal 202, the free line / prohibition bit 203, reception / non-receiving control of straving 2 of going down. As shown in drawing 3, the direction pecket CP for collision bit 204, the partial eatho field 205, and the error detection field 206. control of going down gets down with unique WORD 201, and an outline configuration is carried [0022] <u>Drawing 3</u> is drawing showing the configuration of the direction packet CP for collision

forbidding access from other child offices, it is used. displays "prohibition", when data are being received from a specific child office, and when perents station 101 to the child offices 110, 111, and 112. A frae line / probabition bit 203 beforehand. It gets down end an information signal 202 is data transmitted from the assumed-[0023] Unique WORD 201 is the field for taking a synchronization, and is the bit pattern set up

received, or is used for a check, received correctly. The error detection field 208 does not have an error in the psaket which bromation which the local station sent, and the information which the local station sent is offices 110, 111, and 112 collate the information on this partial echo field 205, and the [0025] The partial echo field 205 judges whether some received data are displayed, the child transmission halt transmit information, and go into a resenting procedure. receiving during signal transmission, the child offices 110, 111, and 112 under data packet corrected, nor the signal is received, it indicates "un-receiving." When it indicates "unreceived correctly, and when neither the case where there is an error which cannot be [0024] Reception / non-receiving bit 204 displays "reception", when a signal without an error is

parforms processing about TOMA-TDD. the frame processing section 2034, and the field strength investigation means 3005, and 3031, the emique WORD Banking Inspection Department 3032, the error detection section 3033, modulation, and a recovery. The clock section 302 generates a periodic pulsa signal, and supplies it to the RF section 301 and the TDMA-TDD processing section 303. storage section 307 of error detection, and the hap place channel calculation section 308. 305 of receive packets, the count storage section 306 of unique WORD un-detecting, the count processing section 303, the ed hoc protocol processing section 304, the number storage section equipment is carried out from the RF section 301, the clock section 302, the TDMA-TDD [0028] The TDMA-TDD processing section 303 is equipped with the slot processing section [0028] The RF section 301 performs transmission and reception of an electric wave, a collision central of going down is continuously sent out using the charmel [say] 111, and 112 of <u>drawing 1</u>. As shown in <u>drawing 4</u>, the outline configuration of the office when building an ad hoe natwork, and comes out [it is vacant and] the direction packet GP for [0027] <u>Destring 4</u> is the block diagram showing the outline configuration of the child offices 110, whether the essured parents station 101 is vacant, comes out and there is about each charmel waves, and each frequency, a total of 12 channels exist when it is judged that it investigates [0026] In Network A, since the frequency which can be used can use four slots to those with $3\,$

received from the RF section 301, and was received from the frame processing section 3034 packet which took out the receive packet from the slot specified out of the receiving bit string specified, and is passed to the RF section 301. [0030] The slot processing section 3031 is embedded into the slot which had the transmitting

the ad had protocol processing section 304. A receive packet is passed to the error detection section 3033 when unique WORD 201 is detected. the packet which received. The result of whether unique WORD 201 was detected is notified to [0031] The unique WORD Barking Inspection Department 3032 detects unique WORD 201 from

error is not detected. The frame processing section 3034 passes only the packet which is section 304. The packet which received is passed to the frame processing section 3034 when an which received. The result of error detection is matified to the ad hoc protocol processing [0032] The error defection section 3033 investigates whether there is any error in the pecket

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protocol processing section 304 related to the ad had protocol processing section 304 among the received peckets to the ad hoo

which unique WORD 201 was un-detecting at the predetermined period. [0034] The count storage section 308 of unique WORD un-detecting memorizes the count from which received. The field strength investigation means 3035 investigates received field strength. nativaris. The number starage section 305 of receive packets counts and memorizes the packet (DOSS) The ad has protocol processing section 304 processes the protocol used in an ad hac

from the assumed parents station 101. and 112, a random number is generated using ID of the assumed-parents station 101 reported ID assigned uniquely every assumed parents office 101. In the case of the child offices 110, 111, case of the assumed parents office 101, a random number is generated by making into the base should hop to the degree in the case of hopping to other cleamels using a random number. In the occurred finishes. The hop place channel calculation section 308 computes the channel which and the count storage seebon 307 of error detection if decision whether this interference has section 305 of receive packets, the count storage section 306 of unique WORD un-detecting actuation of interference eveston will be taken. "O" will be set to each of the number storpps to which these values were set beforehand, it will judge that interference has occurred and storage section 307 of error detection. If it is beyond the predetermined value (for example, 120) memorized by the count storage section 308 of unique WORD un-detecting, and the count example, 240) set up beforehand, the ad hop protocol processing section 304 reads the value storage section 305 of receive packets. When this value turns into a predetermined value (for number storage section 305 of receive packets, and the value is again stored in the number unique WORD Banking Inspection Department 3032, "1" is added to the value stored in the detection. Moreover, if the notice which is not detected [detection or] is received from the of arror detection, and the value is again stored in the count storage section 307 of error urrdstacting. Moreover, if it is notified that there was an error of a reseive packet from the error datection section 3031, "1" is added to the count stored in the count storage section 307 un-detecting, and the value is again stored in the count storage section 308 of unique WORD 3032, "1" is added to the count meanwrized by the count storage section 308 of unique WORD ed hos protocol processing section 304 from the unique WORD Banking Inspection Department produced at the predetermined period. If un-datecting [of unique WORD 201] is notified to the [0005] The count storage section 307 of error detection memorizes the count of error detection

CP for collision control of going down from assumed-parents office 101A and assumed-parents the child office 110 is located in the location which can receive respectively the direction pecket operation, and the child effice 110. As shown in <u>drawing 5</u>, it is drawing showing the case where office) 1018 in the asynchronous interference evasion system concerning the gestalt I of this office (1st assumed parents office) 101A and assumed parents office (2nd assumed parents [0036] <u>Drawing 5</u> is drawing showing an example of the physical relationship of assumed parents

ovasion system concerning the gostatt 1 of this operation. [0037] <u>Drawing 6</u> is a flow chart which shows the actuation in the asyndronous interference

transmitted to the timing that the direction packet CP for collision control of going down is parents station 101A and assumed parents station 1018 completaly synchroniza, and are going down using the same channel The 2nd case where transmission end reception of assumedessumed-perceis station 1018 have eent out the direction packet CP for collision control of essumed-parents station 101A in the condition that assumed parents station 101A and communicate, assumed perents station 1018 carries out channel hop at the same channel as channel to the child office 110, While essumed parents station 101A and the child office 110 packet GP for collision control of going down from essumed parents station 101A are explained have transmitted the direction packet CP for collision control of going down by the separate [0040] The 1st case where assumed parents station 101A and assumed parents station 101B [0039] The following three cases in case the child office 110 is gaing to receive the direction of this operation with reference to drawing 5 and drawing 6 is explained in detail. [0008] Next, actuation of the asynchronous interference evesion system explied to the gestalt

> down to the child office 110 has caused asynchronous interference. 3rd case where do not synchronize but the direction packet CP for collision control of going completely the same, Assumed-parents station 101A and assumed-parents station 101B are the

Department 3002 detects unique WORD 201, and the error detection section 3033 is the case of going down from assumed parents station 101A, the unique WORD Banking Inspection where an error is not detected separate channel and the child effice 110 receives the direction packet CP for collision control (DD41) When, as for the 1st case, assumed-parants station 101A and assumed-parants station 1018 have transmitted the direction packet CP for collision control of going down by the

is passed to the ad hoo protocol processing section 304 (step 405). and, in the case of the packet related to the ad hoc protocol processing section 3D4, the packet [0046] In the frame processing section 3034, the class of packet which received is investigated 3034 by that (inside of drawing, No) by which an error is not debocked (step 404). error detection section 3000 in delivery and the error detection section 3003 (step 403). [0045] In this case, the sent packet (receive pecket) is passed to the frame processing section judges whether the error was detected by the packet by which this packet has been sunt to the that the child effize 110 has taken assumed-parents station 101A and a synchronization, and WORD 201 (shown in drawing 2) set up beforehand is detected (step 402). [0044] In this case, since unique IMORO 201 is detected (Inside of drawing, Yes), it recognizes [0043] The unique WORD Barking Inspection Department 3032 investigates whether unique packet which received is sent to the unique WORD Banking Inspection Department 3032. [DOA2] first — the slot processing section 3031 — a packet — receiving (step 401) — the

the child office 110 are shown. station 1018, the receiving slot 115, and the transmitting slot 116 and the receiving slot 117 of drawing, the transmitting slot 114 of assumed perents station 101A and assumed-parents Nont, the 2nd case is explained with reference to <u>depoing 5, drawing 6</u>, and <u>drawing 7</u>, All over [0048] Desire I is drawing showing an example of a condition synchronous [in grawing θ]. operates according to actuation of an ed hoc protocol henceforth (step 406 (processing according to a receive packet is performed in the ad hoc protocol processing section 304)) [0047] The ad hoe protocol processing section 304 investigates the received packet, and

Inspection Department 3032 receiving (step 401) — the packet which received is sent to the unique WORD Banking of going down is sent out to the completely same timing is explained. [0050] in this case, the child office 110 — the slot processing section 3031 — a packet transmission and reception with assumed parents station 101A and assumed parents station out the direction packet CP for collision control of going down using the same channel 1018 completely synchronize, and the case where the direction packet CP for collision control [0049] Although assumed parents station 101A and assumed parents station 101B have sent

WORD 201 set up beforehand is detected (step 402). [0051] The unique WORD Barking Inspection Department 2002 investigates whether unique

the unique WORD Banking frapection Department 3032 is sent to the error detection section taken essumed parents station 101A and a synchronization, and the packet which received in of drawing. Yes) which can datect unique WORD 201, it recognizes that the child office 110 has the direction packet CP for collision control of going down is the same. Therefore, by that (inside assumed parents station 101A and assumed parents station 101B, since unique NORD 201 of to the completely same thring, and the signal of unique WORD 201 part deforming from perents station 101A and assumed parents station 101B can be received, without being sent out [0052] In this case, the direction packet CP for collision control of going down from assumed-

and notifies that the error was detected to the ad hoc protocol processing section \$04 (step that by which an error is detected in the error debection section 3033 (inside of drawing Yes), the signal of assumed parents station 101A and assumed parants station 101B interfered, it is packet (step 403). Since the packet which received turns into a packet with which the signal of [0053] In the error dataction section 3033, it judges whether the error was detected by the sent

JP,2001-358642,A [HEANS]

of error detaction, section 307 of error detection (step 408), and stores the value in the count storage section 307 section 304 adds "1" to the count of error detection currently recorded on the count stange [0054] If the notice by which the error was detected is received, the ad two protocol processing

(stap 409 (the value stored in the number storage section 305 of receive packets exceeded the section SD5 of receive packets exceeded the threshold (for example, 240) set up beforehand [0055] This condition is repeated and it judges whether the value stored in the number storage

[DO56] When R is not over the threshold at step 409 (traide of drawing, No), it returns to step

[0058] When it is not over the threshold at step 410 (inside of drawing, No.), it returns to step (for example, 120 times) (step 410 (the count of error detection exceeded the threshold 7)) value of the count storage section 307 of error detection exceeded the predatormined threshold (DOS7) When a threshold is exceeded at step 409 (inside of drawing, Yes), it judges whether the

rendom number, and perform channel hop respectively. channel change demand CSI packet compute the channel which should hop to a degree using a assumed parents station 101A and assumed parents station 1018 (step 411). processing section 304 to the slot processing section 3031 through the RF section 301 towards [0060] Assumed-parents station 101A and assumed parents station 101B which received send out channel change demand CS1 packet for the packet from the ad hoe protocol processing section 3034 the packet of the channel change demand CS 1 (shown in <u>drawing 7</u>) dalivery and the frame processing section 3034 Delivery and the slot processing section 3031 interference has produced the ed hoe protocol processing section 804. As apposed to the frame (0059) When a threshold is exceeded at step 410 Omside of drawing, Yea), it is judged that

explain the 3rd case where the direction packet CP for collision control of going down has caused asynchronous interference. assumed parents station 101A and assumed parents station 101B do not synchronize, but parants station 101A and assumed parents station 101B have sent cut the direction packet CP for collision earthrol of gaing down to the child office 110 using the same channel, and further, [0051] <u>Drawing 8</u> is drawing showing other examples of a condition synchronous [in <u>drawing 8</u>]. The 3rd case is explained with reference to <u>drawing 5</u>, <u>drawing 6</u>, and <u>drawing 8</u>. Assumed-

[0092] the child office 110 — the slot processing section 3031 — a packet — receiving (step

) — the pecket which received is sent to the unique WORD Burking inspection Department

WORD 201 set up beforehand is detected (step 402). [0083] The unique WORD Banking Inspection Department 3032 investigates whether unique

that unique NORD 201 was undetactable to the ad hoe protocal processing section 304 (step synchronization (essumed-parents station 1018 cannot take a synchronization), and it notifies drawing). It becomes impossible to take No.), assumed parents station 101A and a for collision control of going down which received set up beforehead is undetectable (among sent out to the same timing. In the child office 110 Unique WORD 201 in the direction packet CP [0064] The direction packet CP for collision control of going down from assumed parents station 101A and essumed parents station 101B it interferes in the form which shifted without being

section 308 of unique WORD un-detecting)). detecting again (stop 413 (1 is edded to the count currently recorded on the count storage unique WORD un-detecting, and stores it in the count storege section 308 of unique WORD un-WORD Banking Inspection Department 3032, the ad hoc protocol processing section 304 adds (1005) If the notice which was not able to detect unique HORD 201 is received from the unique I to the count of unique WORD un-detecting stored in the count storege section 308 of

[0086] When the value stored in the number storage section \$05 of receive packets judges whether the threshold (for exemple, 240) set up beforehend was exceeded (step 414) and is not

over the threshold at step 414 (inside of drawing, No.), it returns to step 401,

of drawing. No.) it returns to step 401. NORD un-detecting exceeded the threshold 7)) and is not over the threshold at step 415 (inside threshold was exceeded at step \$14 (Inside of drawing, Yes) (step \$15 (the count of unique detecting of ** exceeded the threshold (for example, 120 times) set up beforehand when a [0087] When it judges whether the value of the count storage section 308 of unique WORD un-

to his slot timing 3rd assumed parents station,]) temporarily (step 416), and it enables it to transmit and receive synchronization, the child office 110 turns into an essumed parents station (un-disstrating [the section 304, when a threshold is exceeded at step 415 (inside of drawing, Yes), the child office 110 is assumed parents station 101A O. Or it staps taking assumed-perents station 101B and i [0088] shidzing that asymphronous interference has produced the ed hoc protocol processing

continuously (step 419 (continuetion 120 stat sending out of the "interference detection" packet interference condition into the transmitting slot I16 corresponding to this slot — it sends out beforehand set as it in the packet of the interference detection D1 in order to recognize an station 1018 has interfered mutually, the count more than the thresheld (for example, 120 times) CP for collision control of going down from assumed parents station 101A and assumed parents assumed parents station The detected stot judges it as the stot in which the direction packet [0071] When the slot looked for at step 418 is detected (Inside of drawing, Yes), the 3rd the strongest received field strangth is obtained (step 417), (the field strength of all dots is 0070) It judges whether the slot boked for et step 417 was found (etep 418). investigated and the slot of a heavy current community is looked for most) field strength more than the threshold (for example, 40dB) set up beforehand is detected, and received field strength in all the slots of the frequency currently used is investigated, and the temperary, the field strength investigation means 2025 looks for the slot from which the [DD69] Next, in the child office 110 which turned into the &rd assumed-parents station

computed (step 420), hops to the sequired channel (step 421), and availds interference of the direction packet CP for collision cantrol of going down. recognize the packet of the Interference detection D1. Therefore, assumed-parents station 101A D1 is able to be sent out, assumed-parents office 101A or assumed-parents office 101B can 1018 acquires the channel of the hop place which the hop place channel calculation section 303 which has recognized the packet of the interference detection D1, or assumed parents station receiving slot 115 of assumed parents office 101B and the pecket of this interference datection [0072] When it is completely in agreement with the timing in assumed-parents office 101A or the

[0074] The channel of the hop place at which similarly the child office 110 which is the 3rd computed (stap 420), and hops to the acquired channel. 101B acquires the charmel of the hop place which the hop place charmel calculation section 308 Assumed-parents station 101A which has recognized interference, or assumed-parents station period set up beforehand in the non-detected packet of unique WORD 201— it recognizes. assumed parents station 101A or assumed parents station 101B was beforehand set as the out, it is the slot in which it has interfered more than the threshold (for example, 120) with which parents station 1018, and unique WORD 201 is un-detecting, count reception, when it cornes detection DI is sent out at step 419, it is with assumed-parents station 101A and assumedparents station 101A and assumed-parents station 101B and the packet of the interference [0073] On the other hand, when it shifts from the timing in each receiving slot 115 of assumed-

of assumed parents station 101A to which the hop place channel calculation section 308 is reported from assumed parents station 101A is acquired, and it hops to the acquired channel assumed parents station temporarily also generated and computed the random number using (D

office) (step 422), and tries reception of the direction packet CP for collision control of going [0075] The \$4d essumed parents station ratums to the child office (110 (it becomes a child down from assumed-parents station 101A again.

[DD76] If it judges that it was finished whether conducting all slot investigations (step 423) and

0.0

04/

JP,2001-358842,A [MEANS]

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the timing of a dot is shifted a semicircle term (step 424), it returns to step 417, and the has finished Judging et atep 418 when the slot tooked for is undetectable (inside of drawing No.) [0077] Processing is ended when finishing judging at step 423 (Inside of drawing, Yes), received field strength of all alots is investigated again.

the child office 110 as mantioned above. [0078] Asymphronous interference evasion is made between assumed pavents station 101A and

affectiveness hung up over below is done so. ovation system concerning the gestalt of operation are constituted like the above, the [0079] Since the asynchronous interference evasion approach and asynchronous interference

operation] Since the esynchronous interference evasion structure of a system concerning the gostailt 2 of this operation is the same as that of the gestalt 1 of operation, explanation is synohronous [in the asynchronous interference evasion system concerning the gostalt 2 of this esynchronous interference evasion approach for the manitoring device of the child office 110. [0081] (Gestelt 2 of operation) <u>Districts</u> is drawing showing an exemple of a condition wave in the network A equipped with many child offices is feely manageable by using this asynchronous interference evasion is enabled by the positive approach. The received electric recognizes interference by interference produced by interference detection packet sending out, channel hop because essumed parents station 101A or essumed parents station 101B since assumed parents station 101A or assumed parents station 101B is made to perform whether essuared parents station 101B recognizes on interference detection packet and] Or which sent out the interference detection packet and has esused asymphronous interference, Or strength and by the transmitting slot corresponding to the slot Assumed parents station 101A [0080] When ssynchronous interference is detected, discover the highest slot of received field

gustalt 3 of this operation is the same as that of the gestalt f of operation, explanation is operation.] Since the asynchronous interference evasion structure of a system concerning the synchranous [in the asynchronous interference evasion system concerning the gestalt 3 of this [1084] (Acetalt 3 of operation) <u>Drawing 9</u> is drawing showing on example of a condition this actuation compared with the gostalt 1 of operation. (0083) Channel hop can be made to cause in an assumed-parenta office certainly by performing for a slot with the strongest received field strength. Explanation of other signs is omitted. interference detection D1 is sent out by all slots, it becomes unnecessary in this case, to look out by the transmitting stat corresponding to the stat, as shown in drawing 9, the packet of the ectuation ofter step 417 in <u>strawing 0</u> and the packet of the interference detection D1 was sent [0082] Although the slot with the strongest received field strongth was locked for in the

configuration, sto, are not finited to the gestalt of the above-mentioned implementation, but when carrying out this invention, they can be made into a suitable number, a location, a (1088) Moreover, the number of the above-mantioned configuration members, a beation, a opplying this invention, it is applicable to the technique about the suitable asynchronous [1087] In addition, in the gestalt of this operation, this invention is not limited to it, but when interference evasion approach and a suitable esynchronous interference evasion system. receiving slot 117, a channel can be made to be able to hop to assumed-parents office 101A senting out the channel change demand CS I by the transmitting slot IIB corresponding to the without generating interference intentionally, and interference can be availed. 101A and the synchronization which transmit the unique WORD 201 can be taken. Therefore, by whether unique WORD 201 is obtained. If unique WORD 201 is obtained, assumed-parents office shifted before [a bit of] "1", and it investigates whether unique WORD 201 is detected egain. [0088] When unique WORD is not detected, as shown in drawing 10, the location of the stat is [0085] If a slot with the highest received field strength is acquired at step 418 in drawing § , it This octuation is repeated in the range which can detect electric field, and it investigates will investigate whether unique WORD 201 is detected (un-illustrating)

,0039) In addition, in each drawing, the same sign is given to the same component

JP,2001-358642,A [DESCRIPTION OF DRAWDNGS]

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DESCRIPTION OF DRAWINGS

Brief Description of the Drawings,

interference evasion approach concerning the gustelt 1 of operation of this invention <u>Previous 1</u>] It is drowing showing the network outline of performing the asynchronous

 \mathbb{D} raving 2 \mathbb{R} is drawing showing the synchronization between the assumed-parents office of HIDE I , and a child office.

proving 2 of going down Drawing 3] It is drawing showing the configuration of the direction packet for collision control of

<u>Drawing 4)</u> It is the block diagram showing the outline configuration of the child office of $ilde{d}$ arring

system concerning the gostaft 1 of operation of this invention, and a child office. parents station and the 2nd assumed-perents station in the asynchronous interference evasion Dermins 6] It is the flow chart which shows the occuation in the asyndronous interference District 5] R is drawing showing an example of the physical relationship of the Let assumed-

evasion system concerning the gestalt 1 of operation of this invention.

Drawing 91 the asynchronous interference evasion system concerning the gostalt 2 of operation Drawing 6] It is drawing chowing other exemples of a condition synchronous [in graving 6]. n

of this invention — it is drawing showing on example of the synchronous condition to hick $oldsymbol{Drawing}$ $oldsymbol{10}$ It is drawing showing an example of a condition synchronous (in the asynchronous

interference of the conventional technique. interference evasion system concerning the gestalt 3 of operation of this invention.] Ordering 111 it is the block diagram showing an example of a method which avoids asynchronous

<u>Drawing [2]</u> It is the block diagram showing the configuration of the wireless contact of <u>drawing</u>

control unit of drawing 11 [<u>Drawing 13]</u> R is drawing showing the flow of the actuation in the wireless communication

(Description of Notations)

A Notwork

CP The direction packet for collision control of going down

CS1 Channel change demand

D1 interference detection

fi Frequency

1S Stot 12 Frequency

SS Stot

6, 7, 8, 8 Migration machine

4S Stot

1 Wireless Communication Control Unit

2, 3, 4, 5 Wirdess contact

10A, 10B, 10C, 10D Wareless zone

3035 Fleid Strength Investigation Means 3034 Frame Processing Section 3033 Error Detection Section 3002 Unique WORD Banking Inspection Department 3001 Stat Processing Section 308 Hop Place Channel Calculation Section 307 Gount Storage Section of Error Detection 306 Count Storage Section of Unique WORD Un-Detecting 305 The Number Storage Section of Receive Packets 304 Ad Hac Protocol Processing Section 202 Get Down and it is information Signal, 203 Free Line / Prohibition Bit 303 TDMA-TDD Processing Section 302 Clock Section 301 The RF Section 206 Error Dataction Field 205 Partial Echo Field 204 Reception / Non-Receiving Bit 201 Unique WORD 116 Transmitting Slot 115 Receiving Slot 114 Transmitting Stot 1018 Assumed parents station (2nd assumed parents station) 101A Assumed parents station (1st assumed parants station) 108 Communication Channel Control Section 17 Receiving Slot 170, 111, 112 Child office 101 Assumed-Parents Station 109 Slot Synchronizer 108 Interface Section 107 Asynchronous Interference Detecting Element 105 Control Channel Control Section 104 Frame Generation / Decomposition Section 102 Wireless Section 101X Antenna section

* NOTICES *

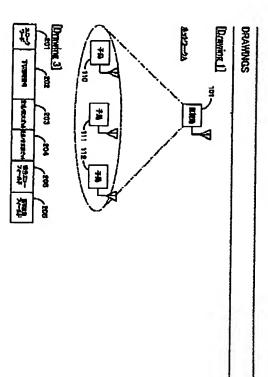
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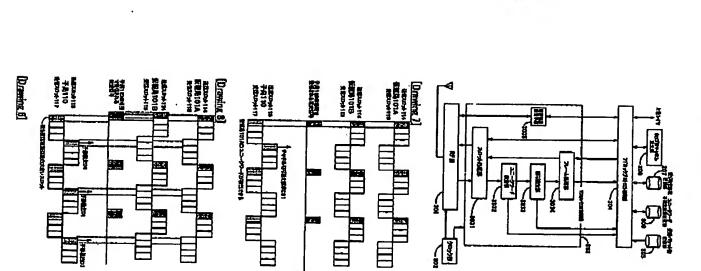
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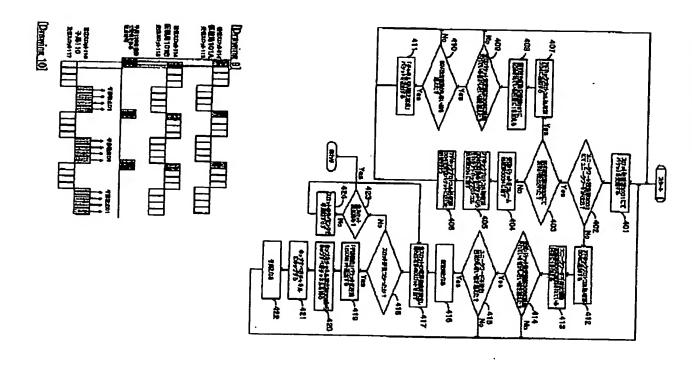


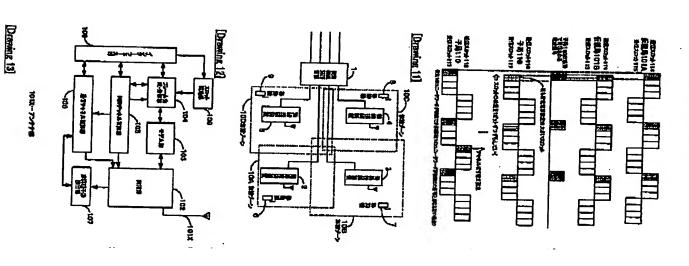


Drawing 5]

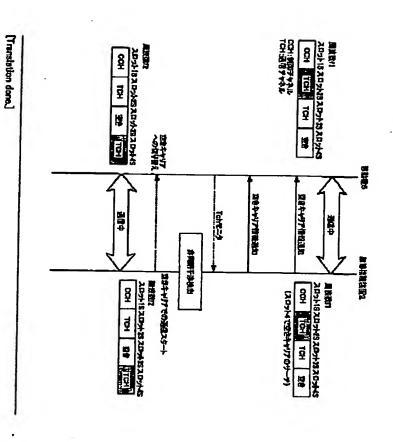
Drawing 4]

BERNING Z









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